4/Pats

Display arrangement and method

Technical field

The present invention relates to a tracking device and a method for a sensory feedback from a cursor status for a cursor with graphical details being scanned or passed in connection with a program or comprising it. More specifically the invention provides a signal to be generated for a sensory feedback generating a movement of the tracking device.

Background of the Invention ~~State of the art~~

The user interface in form of a window (Window') as a facility to access special program functions in a data program is found in almost every modern interface. The program basing on the use of windows comprises also function keys in e.g. key rows, screen and display delimiters and icons, so-called graphic symbols.

To achieve access to the functions contained in the symbols a cursor is controlled by means of a tracking device (computer mouse, trackball, pointer, etc.) over a display unit showing the symbols, the function of the symbol being produced by e.g. pressing a key with one or several touches.

A problem with the control of the cursor to effect the symbols arises when it is difficult to fix the cursor to the symbol in a distinct way to let the touches have the desired effect.

It is easier to hit e.g. keys situated at the edge of a display than one in its centre. To hit a key at the edge the computer mouse is pulled quickly in the right direction to reach the key. It has no importance if the computer mouse is pulled too far. The cursor will anyhow stop at the edge. To hit a key situated e.g. in the centre of the display frame more coordination is however required by a user of the computer mouse to hit the target, thus, the user must e.g. slow down the tracking device before the key is reached to let the cursor land on the key. This step takes time and might be difficult and might even give the user stress and irritation.

A further problem, which is related to the use of tracking devices for said object, is that the user requires a simultaneous feature, i.e. to e.g. quickly localize the key for the memorizing function in a program without necessarily having to let the eye scan the display unit.

In the european patent application EP-A1-0,607,580 a computer mouse with a pin is described receiving signals from a host computer unit effecting the pin which generates

sensory signals to a users finger top e.g. when the cursor status is altered.

The invention according to said EP-application is, however, not without problems in that a finger top must be kept in contact with the pin. Ergonometric studies have shown that the user of a computer mouse when continuously using the computer mouse hardly can keep the finger tops over the same spot over a longer period of time. This is easily understood by ordinary people as some users are easily seized with cramp, writing cramps being a well known complaint. Furthermore, some people suffer from a lighter or heavier trembling. Thus the computer mouse with a pin is restricted in its use for a not negligible part of the users of tracking devices.

Summary of the invention

The present invention intends to solve above mentioned problems related to a window interface and similar in a new and innovative manner.

To achieve said object of the invention it is for marking graphical details in connection with or comprised in the program proposed a tracking device as a user interface for the access of program functions comprised in the details.

A cursor as a tracking device controlling on a display receives a sensory feedback from status signals for a user of the cursor in a host unit, when the cursor hits or passes said graphical details, in such a way that means arranged in the tracking device generate a movement of the tracking device.

The movement of the tracking device consists of that it vibrates, bounces, bumps or slants.

The cursor might be fixed within the limits of optional details, even three-dimensional ones, when the cursor hits the limit or passes it and the cursor is thus released by pushing the tracking device mantle downwards.

A graphical detail might be an icon, a key, a window or a border limiting the window.

Alternatively, graphical details in form of key rows provide various sensory feedback depending on the key and its function.

In a further alternative the cursor being fixed within a detail, is free to move within the borders of the detail.

The cursor, being fixed within a three-dimensional object or detail, is possibly free to move within the volume of the object or the detail in an embodiment with the cursor

possibly generating a shadow within the object or the detail when drawn out of these without first having been released. The shadow allows that the cursor can be moved more easily into the object or the detail. The invention comprises even a method for marking graphical details by means of a tracking device.

Brief description of the drawing

The invention will be described here below more in detail with reference to the attached figures of the drawings, where

Figure 1 schematically illustrates a tracking device in form of a computer mouse connected to a host computer unit with a display showing graphical details and a sensory feedback to the computer mouse according to the invention,

Figure 2 schematically illustrates an alternative sensory feedback in a tracking device according to figure 1,

Figure 3 schematically illustrates a pressing of the tracking device according to figure 1 in an embodiment of the invention,

Figure 4 schematically illustrates in an exploded view of the computer mouse an embodiment of how a means might be arranged in the computer mouse to achieve a movement of the computer mouse,

Figure 5 schematically illustrates how a cursor with a shadow is shown, when the user of the cursor touches a tracking device in a three-dimensional environment according to an embodiment of the invention.

Detailed description of preferred embodiments

The present invention is here described more in detail with alternative embodiments illustrating the technology of the invention and the cognitive, tactile and motoric advantages provided by a tracking device according to the invention.

Figure 1 illustrates schematically a computer mouse 10 connected to a host unit 12 in form of a computer, here a PC, with a display unit 14 and a key board 16.

The present invention with its embodiments specifically describes a computer mouse 10, the invention is however generally applicable to a majority of already known tracking devices such as track balls for portable computers, pointers, etc.

The computer mouse 10 consists of a casing 20 movable in relation to a bottom portion 18 and the conventional function keys 22, 24. Furthermore, the computer mouse is connected to a host unit 12, 14, 16 by means of a signal cable 26 comprising signal lines for

a track balls, here not shown, transmitters in the x and y-direction. Furthermore, the signal cable comprises lines for transmitting status signals for the cursor 28 from a cursor controller comprised in the host unit 12, 14.

The display 14 shows schematically in its frame 30 how the interface might be in a window environment. The frame 30 besides the display cursor 28 a window 32, an icon 34, a display border 36, a line of three keys 40, 42, 44 and three areas with special attributes not to be described in detail.

When the cursor 28 by means of the computer mouse 10 is moved towards or over the periphery 32, 34, 36, 40, 42, 44 of a graphical detail the host unit 12, 14 in one embodiment of the invention generates by means of the cursor controllers status (x- and y-coordinates, status flags, etc.) for the cursor 28 a sensory feedback in form of a signal by means of signal lines in the cable 26. The signal provides that a means arranged in the computer mouse 10 generates a movement of the computer mouse 10, e.g. in a form that the computer mouse vibrates, bounces, bumps, slants, etc.

In an alternative embodiment even the cursor 28 is fixed within the borders, but preferably in such a way, that it is free to move between the borders, e.g. between the borders 32 and 34 for the window and the icon, respectively, if it is fixed within the window.

In fixing the cursor 28 within a graphical detail the status register for the cursor 28 is initiated that a signal is sent to the computer mouse 10 with its casing 20 receiving a sensory feedback in that the cursor 28 has been fixed within or to a graphical detail 32, 34, 36, 40, 42, 44. In the present embodiment the casing 20 vibrates 46 in relation to the bottom portion 18. The complete computer mouse might eventually vibrate in an embodiment without any specific casing and specific bottom portion. A tracking device 10 might instead of vibrating bounce or bump each time the cursor is moved towards or fixed onto a graphical detail.

The vibrations can be achieved by means of devices such as electromagnets, piezoelectric transmitters, composite metals and other devices available in the market possibly achieving vibrations.

Furthermore, the graphical detail, in which the cursor 28 has been fixed, might in another embodiment be identified by means of the vibration frequency. In mots cases it is quite sufficient that a few graphical details are to be identified by means of the vibration frequency, e.g. by means of an enter key, here designates 40, so that a simultaneous effect

is achieved in that e.g. a program or a data file has to be entered. This is achieved without the user necessarily sweeping or drifting with his eyes over the frame 30 to find the enter key 40. In principle most graphical details might, however, be provided with a specific code by means of the vibration frequency.

The cursor 28 being fixed within a frame it must be possibly released from this fixation. According to an embodiment of the present invention this is achieved in that the computer mouse 10 or any other used tracking device is exerted to a pressure downwards effecting a signal transmitter, e.g. a pressure transmitter, to change the status of the cursor 28, the user then feeling as if it presses out the cursor or is diving under the edge of the border, thus improving the perception of the process on the frame 30.
In feeling that the cursor is sliding over e.g. a key 40 the picture of the key 40 is elucidated. In a similar way the picture of a window 32 is intensified.

A parallel to the present invention is the introduction of shadows in graphical interfaces. In that the user can see the shadow of an interface, such as a window, it becomes much easier to understand the concept with several layers in windows, i.e. windows overlapping each other. This provides a three-dimensional effect and improves the aesthetic aspect and provides even an improvement of the users perception of the interface rending it mor effective. The present invention achieves similar features which provides the parallelism.

In figure 2 is shown another embodiment of a sensory feedback according to the invention.

Figure 2 schematically illustrates the computer mouse 10, the casing 20 being movable in relation to the bottom portion 18, slants to the right in the figure, marked by a downwards pointing arrow as a sensory feedback from the status register of the cursor 28. The slanting might even be achieved forwards, backwards, to the left, etc. Thus, the corresponding slanting indicates a code. The slanting to the right might e.g. imply the key for the entering function 40. In the same way, the other slanting positions might indicate the code for another graphical detail 32, 34, 36, 40, 42, 44. Furthermore, alternating slanting positions for a feedback might indicate further codes.

Meanss for slanting the computer mouse 10 might consist of electromagnets, relays, etc.

To leave a fixation within the limited area of a graphical detail or its periphery it is illustrated in figure 3. how the casing of the computer mouse 10 is pressed against the

bottom portion 18. a pressure transmitter e.g. generating a signal to the cursor 28 to leave a limited area, where it previously had been fixed. As already mentioned the computer mouse 10, with the casing 20 and the bottom portion forming together a unit. even by means of a convenient arrangement is provided with a pressure transmitter to achieve signals releasing the cursor 28.

Regarding the arrangement of meanss adapted to generate the sensory feedback in a tracking device it is preferably design precautions for the man of the art, but with reference to figure 4 an embodiment is exemplified how the means might be arranged within a computer mouse 10.

Figure 4 illustrates, how an electromagnet 50 by means of screws is arranged in a means of attachment 52, here fixed by means of screws in the bottom portion 18 of the computer mouse 10. Between the casing 20 and the bottom portion 18 a resilient means 56 is placed. When the computer mouse 10 receives the sensory feedback signal the anchor 58 of the electromagnet 50 hits the casing 20 generating a movement in the casing 20. The movement transforms into a vibration by means of the potential energy stored in the resilient means 56. To achieve a coding of the sensory feedback as described above already known meanss generating pulse sequences might be used.

Moreover, the present invention solves the problems connected to the sensory feedback by means of a pin as described in EP-A1-0-607.580 in that the mouse itself vibrates making it easier for the user with a tendency to be seized with cramp and trembling to use the computer mouse 10. They do not necessarily have to touch the computer mouse with any specific position of the hand as the whole computer mouse according to the invention is moving.

Figure 5 illustrates how a cursor with a shadow is shown, when according to one embodiment of the present invention a user of the cursor touches a tracking device in a three-dimensional virtual surrounding 60, e.g. a space.

The tracking device 10 is moved to a desired virtual object 62 in form of a three-dimensional volume without the object being visible in space. However, the cursor 28 controlled by the pointer might be followed on a display means delimited by means of the solid line 64. The display means is not necessarily a computer screen 30 but may consist of any other form of picture reproduction means, e.g. a mirror.

The object 62 is visible to a user on the display means delimited by the line 64 in

figure 5, i.e. not virtually as the surroundings 60.

Moreover, the cursor 28 has a shadow 66 on the display means 64 remaining within the object, when the cursor is pulled out of the object, if the tracking device is not released by means of e.g. a pressing downwards. A user of the tracking device finds in some way easier back to the object 62 in the virtual surroundings after e.g. a pause or another exit from the space of the object 62. The cursor is then integrated with the shadow when it is situated in the object 62.

The facts mentioned above are e.g. applicable in CAD programs such as ALIAS® i.a. being used in the car industry to design products, where it is a problem to decide, where in the space depth the cursor 28 is situated. It should also be observed that the virtual space 60 may comprise numbers of space objects 62 in various geometric forms, the usefulness of the shadow 66 becoming obvious.

The depth of a space object 62 is e.g. defined by means of a coordinate system 68 in three dimensions, such as a cartesian or a polar system, etc.

Another possible application area for the embodiment above of the cursor 28 with a shadow 66 is in surgery field, e.g. for training of surgical candidates or for more advanced surgery of more or less complicated operations.

A three-dimensional picture or a picture in perspective consists conventionally of a program providing mesh models of objects 62 without any space therein. The space might be calculated in real time when a surface is passed in the object 62. Thus, a surface in the object 62 is defined by means of here not shown polygons rendered in real time, the necessary surface to obtain space thus being obtained.

The present invention has been described with preferred embodiments not to be considered to limit the invention. It is the definition of the claims that defines the invention for the man of art.
